

ENTERED

April 26, 2019

David J. Bradley, Clerk

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

CCONOCOPHILLIPS COMPANY, §
§
Plaintiff, §
§
v. § CIVIL ACTION NO. H-18-0803
§
IN-DEPTH COMPRESSIVE SEISMIC, §
INC., and IN-DEPTH GEOPHYSICAL §
INC., §
§
Defendants. §

MEMORANDUM OPINION AND ORDER

This action is brought by plaintiff, ConocoPhillips Company, against defendants, In Depth Compressive Seismic Inc. and In-Depth Geophysical, Inc., under the Patent Laws of the United States, 35 U.S.C. § 1, et seq., for infringement of four United States Patents:¹ (1) U.S. Patent No. 8,897,094 ("the '094 Patent"), entitled "Marine Seismic Data Acquisition Using Designed Non-Uniform Streamer Spacing," issued on November 25, 2014;² (2) U.S. Patent No. 9,632,193 ("the '193 Patent"), entitled "Compressive Sensing," issued on April 25, 2017;³ (3) U.S. Patent No. 9,823,372 ("the '372 Patent") entitled, "Controlled Spaced Streamer

¹Plaintiff's Complaint and Request for Preliminary Injunction ("Plaintiff's Complaint"), Docket Entry No. 1.

²Exhibit 1 to Plaintiff's Complaint, Docket Entry No. 1-2.

³Exhibit 2 to Plaintiff's Complaint, Docket Entry No. 1-3.

Acquisition," issued on November 21, 2017;⁴ and (4) U.S. Patent No. 9,846,248 ("the '248 Patent"), entitled "Seismic Data Acquisition Using Designed Non-Uniform Receiver Spacing," issued on December 19, 2017.⁵ Plaintiff has also asserted claims against the defendants for false and misleading statements under the Lanham Act, 15 U.S.C. § 1125. Plaintiff and defendants disagree about the meaning of nine terms used in the '248 Patent and three terms used in the '193 Patent and ask the court to construe the disputed terms.⁶ See Markman v. Westview Instruments, Inc., 116 S. Ct. 1384, 1387 (1996) ("We hold that the construction of a patent, including terms of art within its claim, is exclusively within the province of the court.").

In support of its preferred constructions plaintiff has filed Plaintiff's Opening Claim Construction Brief ("Plaintiff's Opening Brief") (Docket Entry No. 40), in response to which defendants have filed Defendant's Response (Docket Entry No. 41), plaintiff has replied in Plaintiff's Reply Claim Construction Brief ("Plaintiff's

⁴Exhibit 3 to Plaintiff's Complaint, Docket Entry No. 1-4.

⁵Exhibit 4 to Plaintiff's Complaint, Docket Entry No. 1-5.

⁶The parties originally disagreed about the meaning of two additional terms used in the '094 Patent and the '372 Patent, respectively. But defendants have agreed to the plain and ordinary meaning for those terms. See Defendants' Responsive Claim Construction Brief ("Defendants' Response"), Docket Entry No. 41, p. 5. Page numbers for docket entries in the record refer to the pagination inserted at the top of the page by the court's electronic filing system, CM/ECF.

Reply") (Docket Entry No. 44), and defendants have replied in Defendants' Claim Construction Sur-Reply ("Defendants' Sur-Reply") (Docket Entry No. 46). The parties have also filed their P.R. 4-3 Joint Claim Construction and Prehearing Statement ("Joint Claim Construction Statement") (Docket Entry No. 38). On March 28, 2019, the court conducted a hearing at which the parties presented argument on four of the disputed terms.⁷ After the hearing defendants filed Defendants' Supplemental Briefing after Markman Hearing (Docket Entry No. 50), and plaintiff filed Plaintiff ConocoPhillips Company's Supplemental Briefing after Markman Hearing (Docket Entry No. 51). The proper construction of eleven claim terms remains in dispute. The parties also dispute the effect of the "preamble" on one claim term. After carefully considering the parties' arguments, the evidence, and the applicable law, the court construes the disputed terms as stated below.

I. Legal Standard for Claim Construction

In Markman, 116 S. Ct. at 1387, the United States Supreme Court held that the construction of patent claims is a matter of law exclusively for the court. When the parties dispute the meaning of particular claim terms,

⁷See Minutes, Docket Entry No. 47. See also Markman Hearing Transcript, Docket Entry No. 52.

the judge's task is not to decide which of the adversaries is correct. Instead the judge must independently assess the claims, the specification, and if necessary the prosecution history, and relevant extrinsic evidence, and declare the meaning of the claims.

Exxon Chemical Patents, Inc. v. Lubrizol Corp., 64 F.3d 1553, 1556 (Fed. Cir. 1995), cert. denied, 116 S. Ct. 2554 (1996).

Courts begin claim construction by ascertaining the "ordinary and customary meaning" of disputed claim terms. Phillips v. AWH Corporation, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc), cert. denied, 126 S. Ct. 1332 (2006) (quoting Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." Id. at 1313 (citing Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc., 381 F.3d 1111, 1116 (Fed. Cir. 2004)). "[T]he person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." Id.

In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words. See Brown v. 3M, 265 F.3d 1349, 1352 (Fed. Cir. 2001) (holding that the claims did "not require elaborate

interpretation"). In such circumstances, general purpose dictionaries may be helpful. In many cases that give rise to litigation, however, determining the ordinary and customary meaning of the claim requires examination of terms that have a particular meaning in a field of art. Because the meaning of a claim term as understood by persons of skill in the art is often not immediately apparent, and because patentees frequently use terms idiosyncratically, the court looks to "those sources available to the public that show what a person of skill in the art would have understood disputed claim language to mean." Innova, 381 F.3d at 1116. Those sources include "the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art."

Id. at 1314 (quoting Innova, 381 F.3d at 1116).

"Generally speaking, [courts] indulge a 'heavy presumption' that a claim term carries its ordinary and customary meaning." CCS Fitness, Inc. v. Brunswick Corp., 288 F.3d 1359, 1366 (Fed. Cir. 2002). "For example, if an apparatus claim recites a general structure (e.g., a noun) without limiting that structure to a specific subset of structures (e.g., with an adjective), [the court] will generally construe the term to cover all known types of that structure that are supported by the patent disclosure." Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243, 1250 (Fed. Cir. 1998). See, e.g., Virginia Panel Corp. v. MAC Panel Co., 133 F.3d 860, 865-66 (Fed. Cir. 1997), cert. denied, 119 S. Ct. 52 (1998) (term "reciprocating" is given its ordinary meaning and not limited to mere linear reciprocation); Sjolund v. Musland, 847 F.2d 1573, 1581-82 (Fed. Cir. 1988) (refusing to limit "baffle" to rigid baffles and "panel" to panels of lattice construction).

There are several exceptions to the general rule that claim terms carry their ordinary and customary meaning. A "claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history." CCS Fitness, 288 F.3d at 1366. See also Hormone Research Foundation, Inc. v. Genentech, Inc., 904 F.2d 1558, 1563 (Fed. Cir. 1990), cert. dismissed, 111 S. Ct. 1434 (1991) ("It is a well-established axiom in patent law that a patentee is free to be his or her own lexicographer . . . and may use terms in a manner contrary to or inconsistent with one or more of their ordinary meanings."). A claim term may also be interpreted more narrowly than it otherwise would be "if the intrinsic evidence shows that the patentee distinguished that term from prior art on the basis of a particular embodiment, expressly disclaimed subject matter, or described a particular embodiment as important to the invention." Id. at 1366-67 (citing Spectrum International, Inc. v. Sterilite Corp., 164 F.3d 1372, 1378 (Fed. Cir. 1998) (limiting term's ordinary meaning based on statements that distinguished the invention from prior art); SciMed Life Systems, Inc. v. Advanced Cardiovascular Systems, Inc., 242 F.3d 1337, 1343-44 (Fed. Cir. 2001) (limiting claim term based in part on statements in the specification indicating that "all embodiments" of the claimed

invention used a particular structure); and Toro Co. v. White Consolidated Industries, Inc., 199 F.3d 1295, 1301-02 (Fed. Cir. 1999) (limiting claim term based in part on statements in the specification describing a particular structure as "important to the invention"). "A claim term also will not have its ordinary meaning if the term 'chosen by the patentee so deprive[s] the claim of clarity' as to require resort to the other intrinsic evidence for a definite meaning." Id. at 1367 (quoting Johnson Worldwide Associates, Inc. v. Zebco Corp., 175 F.3d 985, 990 (Fed. Cir. 1999)). And "[a]s a matter of statutory authority, a claim term will cover nothing more than the corresponding structure or step disclosed in the specification, as well as equivalents thereto, if the patentee phrased the claim in step- or means-plus-function format." Id. (citing 35 U.S.C. § 112 ¶ 6).

Courts rely on two types of evidence when considering claim construction disputes: (1) intrinsic evidence (i.e., the language of the claim itself, the patent specification, and the prosecution history of the patent) and (2) extrinsic evidence (i.e., evidence external to the patent and prosecution history such as dictionaries, treatises, and expert and inventor testimony). CCS Fitness, 288 F.3d at 1366.

A. Intrinsic Evidence

The language of the claim is "'of primary importance, in the effort to ascertain precisely what it is that is patented.'" Phillips, 415 F.3d at 1312 (quoting Merrill v. Yeomans, 94 U.S. 568, 570 (1876)). This is "[b]ecause the patentee is required to 'define precisely what his invention is.'" Id. (quoting White v. Dunbar, 7 S. Ct. 72, 75 (1886)). Courts, therefore, carefully consider the context within which a particular term is used in an asserted claim, as well as how the term is used in other claims within the same patent. Id. at 1314. Other intrinsic sources can also be helpful. For example, "the specification 'is always highly relevant to the claim construction analysis'" and can be either dispositive or "the single best guide to the meaning of a disputed term." Id. at 1315 (quoting Vitronics, 90 F.3d at 1582). See also CVI/Beta Ventures, Inc. v. Tura LP, 112 F.3d 1146, 1153 (Fed. Cir. 1997), cert. denied sub nom. Marchon Eyewear v. Tura LP, 118 S. Ct. 1039 (1998) ("[T]he patent drawings are highly relevant in construing the . . . limitations of the claims."). While "[i]t is therefore entirely appropriate for a court, when conducting claim construction, to rely heavily on the written description [i.e., the specification] for guidance as to the meaning of the claims," Phillips, 415 F.3d at 1317, it is important that the specification be used only to interpret the meaning of a claim, not to confine patent claims to the embodiments described therein. Id. at 1323

("although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments").

The patent's prosecution history should also be considered when offered for purposes of claim construction. Phillips, 415 F.3d at 1317. The prosecution history "consists of the complete record of the proceedings before the PTO and includes the prior art cited during the examination of the patent." Id. "[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." Id. But "because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final production of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." Id.

B. Extrinsic Evidence

The court may also look to extrinsic evidence, including dictionaries, treatises, and expert testimony, to help it reach a conclusion as to a term's meaning. See Phillips, 415 F.3d at 1317-18 (citing Vitronics, 90 F.3d at 1583). The court must be mindful that extrinsic evidence may only supplement or clarify – not displace or contradict – the intrinsic evidence. Id. at 1319.

II. Construction of Disputed Terms

The parties dispute the construction of nine terms used in the '248 patent, and three terms used in the '193 patent. The disputed terms in the '248 patent are: (1) "two horizontal directions," (2) "both horizontal directions," (3) "in at least one horizontal direction," (4) "in at least one direction," (5) "deliberately non-uniform," (6) "the deliberately non-uniform direction," (7) "the non-uniform spacing direction," (8) "the non-uniform direction," and (9) "wherein the receivers are not aligned in at least one of the two horizontal directions." The disputed terms in the '193 patent are: (1) "determining optimal sampling grid during seismic data reconstruction," (2) "deriving a mutual coherence proxy, wherein the mutual coherence proxy is a proxy for mutual coherence when S is over-complete and wherein the mutual coherence proxy is exactly the mutual coherence when S is a Fourier transform," and (3) "stochastic global optimization method."

A. Terms from the '248 Patent

1. "Two Horizontal Directions" and Related Terms

(a) "Two Horizontal Directions"

Disputed Term	Patent	Plaintiff's Construction	Defendants' Construction
"two horizontal directions"	'248 claims 1, 10, 14 and 15	Plain and ordinary meaning.	Along each source or receiver line (in-line) and between each source or receiver line (cross-line).

Citing Phillips, 415 F.3d at 1314, and asserting that "[t]he '248 Patent does not set out a special definition for 'two horizontal directions,'"⁸ plaintiff argues that the term "two horizontal directions"

is easily understood and needs no construction. For example, looking down at a piece of paper, there are two horizontal directions on the paper (figuratively referred to as, e.g., left/right and up/down, north/south and east/west, or simply the "x" and "y" directions). This understanding of "two horizontal directions" is nothing more than application of the widely accepted meanings of these words.⁹

Defendants respond that their proposed construction of "two horizontal directions" to mean "along each source or receiver line (in-line) and between each source or receiver line (cross-line)" is "consistent within the context of the claims, the specification, and the prosecution history."¹⁰ In support of their proposed construction defendants cite (1) the detailed descriptions of the arrangements in FIGS. 2-5 and 7-10 which "refer[] to spacing along each source or receiver line (also referred to as in-line) and source or receiver line spacing (i.e. between each source or receiver line-also referred to as cross-line);"¹¹ (2) the critical question identified in the specification, i.e., "how variable can

⁸Plaintiff's Opening Brief, Docket Entry No. 40, p. 12.

⁹Id. at 11-12.

¹⁰Defendants' Response, Docket Entry No. 41, p. 19.

¹¹Id. at 18 (citing '248 Patent, Docket Entry No. 1-5 at 7:3, 7-8, 48-52; 8:5-20, Table 1).

we space the lines and stations and still recover our wavefield accurately,"¹² and (3) statements that plaintiff made to distinguish the '248 Patent from prior art during the prosecution history, i.e., that

[c]laims 1, 11 and 16 recite methods of acquiring marine seismic data by intentionally introducing non-uniform spacing between seismic receivers and/or seismic sources. . . More specifically, the spacing between receiver lines can vary (59ab vs 59bc in FIG. 5) as well as the spacing between receivers within a receiver line (57 of FIG. 5), which account for the variation along two horizontal directions (FIG. 5 represents a top view).¹³

Defendants argue that this prosecution history "confirms that the spacing along each receiver line (in-line) and between each receiver line (cross-line) accounts for the variation along two horizontal directions."¹⁴

Plaintiff responds that "Figures 6 and 11 in the '248 patent provide undisputable intrinsic evidence that 'two horizontal directions' are not limited to 'in-line' or 'cross-line.'"¹⁵

Plaintiff argues:

Tellingly, Defendants cite Figures 2-5 and 7-10 and omit any reference to Figures 6 and 11 in their argument. . . Instead, they state their position is supported by "almost every embodiment." . . . To be sure, the embodiments that Defendants fail to mention are the

¹²Id. (citing '248 Patent at 4:27-28)

¹³Id. at 18-19 (quoting Conoco's Appeal Brief, Exhibit H, p. 4, Docket Entry No. 41-9, p. 5).

¹⁴Id. at 19.

¹⁵Plaintiff's Reply, Docket Entry No. 44, p. 6.

embodiments shown in Figures 6 and 11 that directly contradict their proposed construction.¹⁶

Defendants reply that plaintiff "misapplies [defendants'] construction because the specification uses source and receiver lines to describe all the figures – including figures 6 and 11 where the sources and receivers are not aligned, and lines are not illustrated between the sources and receivers."¹⁷ Defendants explain that

[a]lthough figures 6 and 11 do not illustrate lines between the receivers, it is clear from their description that each includes "an inventive arrangement of lines of seismic receivers." Dkt. 41-3 ('248 Patent) at 3:4-6; 20-22. Likewise, none of the figures illustrate lines between the source points, however, the figures are consistently referred to as illustrating source and receiver lines. Dkt. 41 at p. 14.¹⁸

After carefully considering all of the evidence the court concludes that the term "two horizontal directions" is sufficiently clear to make even resort to a dictionary unnecessary. See Chef America, Inc. v. Lamb-Weston, Inc., 358 F.3d 1371, 1373 (Fed. Cir. 2004) (as a general rule ordinary English words "whose meaning is clear and unquestionable" need no further construction). Neither party has argued the existence of a customary meaning in the art that differs from or contradicts the plain and ordinary meaning stated by the plaintiff. Nor does anything in either the

¹⁶Id. at 7.

¹⁷Defendants' Sur-Reply, Docket Entry No. 46, p. 7.

¹⁸Id.

specification or the prosecution history clearly support the defendant's contention that the plaintiff intended to use the term "two horizontal directions" in a manner other than according to its plain and ordinary meaning. Although the specification discloses source and receiver lines, those lines are discussed only with respect to specific examples of the invention described in the specification, and "[a]s a general rule claims of a patent are not limited to the preferred embodiment . . . or to the examples listed within the patent specification." Dow Chemical Co. v. United States, 226 F.3d 1334, 1342 (Fed. Cir. 2000). See also Innova, 381 F.3d at 1117 ("[P]articular embodiments appearing in the written description will not be used to limit claim language that has broader effect.").

Defendants also argue that the plaintiff ascribed a special meaning to the term "two horizontal directions" in the prosecution history. See Spectrum International, 164 F.3d at 1378-79 (explicit meanings given to claim terms in order to overcome prior art will limit those terms accordingly). In particular, defendants argue that during prosecution of the '248 patent plaintiff argued in a June 8, 2011, appeal brief that

Claims 1, 11 and 16 recite methods of acquiring marine seismic data by intentionally introducing non-uniform spacing between seismic receivers and/or seismic sources. More specifically, the spacing between receiver lines can vary (59ab vs 59bc in FIG. 5) as well as the spacing between receivers within a receiver line (57 of FIG. 5), which account for the variation along two horizontal directions (FIG. 5 represents a top view). This non-

uniform or irregular spacing can acquire seismic data that can be more accurately reconstructed. . .

Clay is deficient because it does not teach the feature described above. Contrary to the Examiner's assertion, FIG. 7 of Clay does not disclose the limitation "wherein the receivers are not aligned in at least one of the two horizontal directions."¹⁹

Defendants argue that these statements in the June 8, 2011, appeal brief "clearly confirm[] that the spacing along each receiver line (in-line) and between each receiver line (cross-line) accounts for the variation along two horizontal directions."²⁰ However, defendants overlook the fact that the appeal brief referred to only one figure, Figure 5 of the '248 application, a figure that expressly showed spacing between receiver lines and between receivers within a line. The argument cited by defendants was focused on Figure 5 and neither characterized all embodiments as falling within the description of that one figure nor clearly disavowed embodiments represented in other figures not addressed in that brief. See Home Diagnostics, Inc. v. LifeScan, Inc., 381 F.3d 1352, 1358 (Fed. Cir. 2004) ("Absent a clear disavowal or contrary definition in the specification or the prosecution history, the patentee is entitled to the full scope of its claim language."). To the contrary, the appeal brief stated that "Claims 1, 11 and 16 . . . intentionally introduc[e] non-uniform spacing between seismic

¹⁹Appeal Brief, Exhibit H, Docket Entry No. 41-9, p. 5.

²⁰Defendants' Response, Docket Entry No. 41, p. 19.

receivers and/or seismic sources.”²¹ This broad description of non-uniform spacing is consistent not only with Figure 5 but also with Figures 6 and 11 which do not depict any in-line or cross-line deployment of receivers. The patentee’s description of an embodiment where receiver lines and source lines are present sheds no light on the meaning of “two horizontal directions” in embodiments where receiver lines and source lines are not present, e.g., Figures 6 and 11. Instead, this exchange is an example of how carefully-crafted arguments in support of patentability can avoid creating ambiguous or adverse prosecution history. By stating clearly and particularly that the statements in the brief described the embodiment shown in Figure 5, the applicant ensured that those of ordinary skill in the art – as well as courts, if need be – could evaluate the import and scope of the statements. Thus, because this argument was plainly limited to the embodiment shown in Figure 5, it cannot be said to be a clear statement limiting the scope of “two horizontal directions” in general. Defendants thus have not shown that sufficient reasons exist to import a limited definition of this term into the clear language of the claims.

Neither the term “in-line” nor the term “cross-line” used in the defendants’ proposed construction appear in the ‘248 Patent, and as defendants recognize, “[t]he term ‘two horizontal

²¹Appeal Brief, Exhibit H, Docket Entry No. 41-9, p. 5.

directions' . . . refers to the lateral spacing between seismic receivers and/or between seismic source points,"²² i.e., not between seismic receiver lines or seismic source lines. This conclusion is supported by the language of the claims in which the term "two horizontal directions" occurs because each of those claims clearly states that the spacing in "two horizontal directions" refers to spacing between any two receivers or any two sources, not between any two receiver lines or source lines. In pertinent part the patent states:

The invention claimed is:

1. A method of acquiring seismic data comprising the steps of:

a. deploying receivers in a survey area wherein **each receiver is laterally spaced from one another in two horizontal directions** wherein the lateral spacing in at least one horizontal direction is deliberately non-uniform, **wherein the receivers are not aligned in at least one of the two horizontal directions** and wherein **the spacing between any two seismic receivers** in the deliberately non-uniform direction varies by a distance of at least five percent between the largest spacing and smallest spacing;

. . .

10. A method of acquiring seismic data comprising the steps of:

a. deploying receivers in a survey area and identifying seismic source points within the survey area **where each source point is laterally spaced from one another in two horizontal directions** wherein the lateral spacing in at least one horizontal direction is deliberately non-uniform, **wherein the**

²²Defendants' Response, Docket Entry No. 41, p. 18.

receivers are not aligned in at least one of the two horizontal directions and wherein the spacing between any two seismic source points in the deliberately non-uniform direction varies by a distance of at least five percent between the largest spacing and smallest spacing;

. . .

14. A method of acquiring seismic data comprising the steps of:

a. deploying receivers in a survey area where each receiver is laterally spaced from one another in two horizontal directions and identifying source points wherein each source point is laterally spaced from one another wherein the lateral spacing for each of the source points and for each of the receivers is deliberately non-uniform in at least one horizontal direction, wherein the receivers are not aligned in at least one of the two horizontal directions and wherein the horizontal spacing between any two seismic receivers in the deliberately non-uniform direction varies by a distance of at least five percent between the largest spacing and smallest spacing and further wherein the horizontal spacing between any two seismic source points in the deliberately non-uniform direction varies by a distance of at least five percent between the largest spacing and smallest spacing.²³

The court concludes that the term "two horizontal directions" is not limited to spacing "along each source or receiver line (in-line) or between each source or receiver line (cross-line)" as defendants argue but, instead, needs no construction and is subject only to its plain and ordinary meaning.

²³ 248 Patent, 10:30-42, 11:24-36, and 12:6-24 (emphasis added).

(b) Terms Related to "Two Horizontal Directions"

Disputed Term	Patent	Plaintiff's Construction	Defendants' Construction
"both horizontal directions"	'248 claims 2, 11, 15	Plain and ordinary meaning.	Both of the two horizontal directions.
"in at least one horizontal direction"	'248 claims 1, 10, and 14	Plain and ordinary meaning.	In at least one of the two horizontal directions.
"in at least one direction"	'248 claims 2 and 11	Plain and ordinary meaning.	In at least one of the two horizontal directions.

Plaintiffs argue that the terms related to the term "two horizontal directions," i.e., "both horizontal directions," "in at least one horizontal direction," and "in at least one direction," need no further construction as their meanings are also readily apparent, and that defendants' proposed constructions are consistent with their plain and ordinary meanings.²⁴ Defendants respond that their proposed constructions of these terms is needed to insure consistency and avoid confusion because these phrases are not consistently worded with reference to the term "two horizontal directions" used throughout the claims.²⁵ Asserting that it "takes no issue with the fact that these terms should be understood to

²⁴Plaintiff's Opening Brief, Docket Entry No. 40, p. 13.

²⁵Defendants' Response, Docket Entry No. 41, p. 20.

relate back to 'two horizontal directions,'"²⁶ plaintiff argues that these phrases need no construction because their meanings are "readily apparent even to lay judges."²⁷

In determining the plain and ordinary meaning of terms, courts must consider the contexts in which the terms are used. See ACTV, Inc. v. Walt Disney Co., 346 F.3d 1082, 1088 (Fed. Cir. 2003) ("[T]he context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms."). When viewed in the context of the surrounding claim language the related terms need no construction because the surrounding language makes it readily apparent that the related terms relate back to the term "two horizontal directions" that the court has already concluded is subject only to is plain and ordinary meaning. Accordingly, the court concludes that the terms related to the term "two horizontal directions," i.e., "both horizontal directions," "in at least one horizontal direction," and "in at least one direction," need no further construction as their meanings are also readily apparent.

²⁶Plaintiff's Reply, Docket Entry No. 44, p. 10.

²⁷Id. (quoting Phillips, 415 F.3d at 1314).

2. "Deliberately Non-Uniform" and Related Terms

(a) "Deliberately Non-Uniform"

Disputed Term	Patent	Plaintiff's Construction	Defendants' Construction
"deliberately non-uniform"	'248 claims 1-2, 10-11, 14-15	Not random and non-uniform.	Non-uniform or irregular spacing between seismic receivers and/or seismic source points intended for more accurate reconstruction of the seismic data acquired.

Asserting that the parties do not dispute the word "non-uniform" is used interchangeably with "irregular" and needs no construction in the '248 Patent,²⁸ plaintiff argues that "the only dispute about the term "deliberately non-uniform" concerns construction of the word "'deliberately' . . . [but that defendants' construction does not actually provide any definite definition for 'deliberately.'"²⁹ Asserting that the word "deliberately" means "not random," plaintiff argues that

[t]he claims confirm that the sensor placement is "deliberate" and not random by requiring specific spacing between the sensors. See, e.g., ['248 Patent] at claim 1 ("wherein the spacing between any two seismic receivers in the deliberately non-uniform direction varies by a distance of at least five percent"); claim 2 ("the receivers are spaced in a deliberately non-uniform spacing in both horizontal directions where the largest spacing is at least five percent larger than the smallest spacing in at least one direction"); claim 10 ("wherein

²⁸Plaintiff's Opening Brief, Docket Entry No. 40, p. 14.

²⁹Id. See also Defendants' Response, Docket Entry No. 41, p. 20 ("Because the terms 'non-uniform' and 'irregular' are not in dispute, only the meaning of 'deliberately' remains in dispute.").

the spacing between any two seismic source points in the deliberately non-uniform direction varies by a distance of at least five percent"); see also similar language in claims 11, 14, and 15.³⁰

Plaintiff also argues that defendants "improperly seek to redraft the single word 'deliberate' into a significantly longer and more confusing phrase."³¹

Asserting that plaintiff's description of the patent's critical objective and use of that critical objective to distinguish prior art are limiting, defendants argue that their proposed construction of "deliberately" as "intended for more accurate reconstruction of the seismic data acquired," is based on plaintiff's description of the patent's critical objective and is not only consistent with the intrinsic record but is also more closely aligned with how a person of ordinary skill in the art would understand the word "deliberately" than is plaintiff's proposal to construe the word to mean "not random."³²

Citing the declaration of defendants' expert, Ozgur Yilmaz, plaintiff replies that defendants do not dispute that the plain and ordinary meaning of "deliberately" is "intentional, and that defendants' reliance on the intended result instead of the plain and ordinary meaning is improper because "claims are not 'limited

³⁰Plaintiff's Opening Brief, Docket Entry No. 40, p. 15.

³¹Id. at 16.

³²Defendants' Response, Docket Entry No. 41, p. 23.

to features found in what the written description presents as mere embodiments, where the claim language is plainly broader.'"³³

In their sur-reply defendants argue that "neither deliberate nor intentional mean 'not random' as the non-uniform or irregular spacing pattern could be deliberately or intentionally random and nothing in the specification or the claims precludes a random spacing pattern."³⁴ Defendants also argue that neither they nor their expert ever conceded that "intentional" means "not random."³⁵

The court is not persuaded by either the plaintiff's proposed construction of "deliberately" as "not random" or the defendants' proposed construction of "deliberately" as "intended for more accurate reconstruction of the seismic data acquired." The court concludes that the term "deliberately non-uniform" is subject only to its plain and ordinary meaning, *i.e.*, intentionally irregular.

As detailed above, the parties agree that the plain and ordinary meaning of "non-uniform" is "irregular," and that the plain and ordinary meaning of "deliberately" is "intentional." Neither party has cited any intrinsic or extrinsic evidence showing

³³Plaintiff's Reply, Docket Entry No. 44, p. 11 (citing In re Papst Licensing Digital Camera Patent Litigation, 778 F.3d 1255 (Fed. Cir. 2015) (citing Phillips, 415 F.3d at 1323)). See also plaintiff's Opening Brief, Docket Entry No. 40, p. 14 (arguing that "Defendants improperly incorporate one benefit of the various embodiments in the '248 Patent; *i.e.*, more accurate reconstruction of the seismic data").

³⁴Defendants' Sur-Reply, Docket Entry No. 46, p. 10.

³⁵Id.

that "deliberately" or "intentional" should be construed to mean either "not random" as plaintiff contends or "intended for more accurate reconstruction of the seismic data acquired" as defendants contend. Plaintiff bases its argument that "deliberately" means "not random" on a citation from the detailed description of the invention stating that "a random placement of receivers is not desired,"³⁶ and on citations to the claims that plaintiff argues "confirm that the sensor placement is 'deliberate' and not random by requiring specific spacing between the sensors."³⁷ But none of the claims contain the word "random," and nothing in either the description of the invention or the claims precludes the arrangement of receivers or sources from being random. The description of the invention merely states that random arrangement is not desired, not that random arrangement is precluded.

Defendant's argument that "deliberate" should be construed as an expression of the patent's critical objective, i.e., "intended for more accurate reconstruction of the seismic data acquired," fares no better because the caselaw on which defendants rely only stands for the unremarkable principle that the meaning of a claim may be limited by a preferred embodiment or feature where it is

³⁶Plaintiff's Opening Brief, Docket Entry No. 40, p. 15 (citing '248 Patent, 4:17-18, Docket Entry No. 1-5, p. 16 ("a random arrangement of receivers or sources is not desired")).

³⁷Id. (citing claims 1-2, 10-11, and 14-15, '248 Patent, 10:31-55, 11:24-47, 12:6-39, Docket Entry No. 1-5, pp. 19-20).

described as important to the invention. See Toro, 199 F.3d at 1301-02; Alloc. Inc. v. International Trade Commission, 342 F.3d 1361, 1368, 1370 (Fed. Cir. 2003), cert. denied, 124 S. Ct. 2390 (2004) (limiting the claims by requiring the objective of "play," even though the term is not cited in the claims because "the #907 specification read as a whole leads to the inescapable conclusion that the claimed invention must include play in every embodiment."). Defendants cite no authority for their contention that a disputed term used in less than all of the claims can or should be interpreted as a construct of the invention's critical objective. Accordingly, the court concludes that the term "deliberately non-uniform" is not limited to "not random" as plaintiff argues, or to "intended for more accurate reconstruction of the seismic data acquired," as defendants argue but, instead, needs no construction and is subject only to its plain and ordinary meaning, "intentionally irregular."

(b) Terms Related to "Deliberately Non-Uniform"

Disputed Term	Patent	Plaintiff's Construction	Defendants' Construction
"the deliberately non-uniform direction"	'248 claims 1, 10, and 14	Plain and ordinary meaning.	At least one of the two horizontal directions in which the spacing between seismic receivers and/or seismic source points is deliberately non-uniform.
"the non-uniform spacing direction"	'248 claims 3-9, 12-13, and 16		
"the non-uniform direction"	'248 claims 3-9, 12-13, and 16		

Plaintiff argues that the terms related to "deliberately non-uniform," i.e., "the deliberately non-uniform direction," "the non-uniform spacing direction," and "the non-uniform direction," need no further construction because their meanings are easily understood.³⁸ Plaintiff argues that defendants' proposed constructions recite the plain and ordinary meaning, but also include an extraneous clause related to spacing that is redundant because the surrounding claim language already recites spacing between receivers and/or source points.³⁹ Asserting that plaintiff "appears to agree that the meaning of each phrase should be the same,"⁴⁰ defendants argue that a common construction, as they propose, is needed to insure consistency and avoid confusion.⁴¹

When viewed in the context of the surrounding claim language the terms related to "deliberately non-uniform" need no construction because the surrounding language makes their meanings readily apparent while defendants' proposed construction introduces redundancy related to spacing because the surrounding claim

³⁸Plaintiff's Opening Brief, Docket Entry No. 40, p. 17.

³⁹Id. See also Plaintiff's Reply, Docket Entry No. 44, p. 14 ("the meaning of these related phrases is 'readily apparent even to lay judges'").

⁴⁰Defendants' Response, Docket Entry No. 41, p. 24 (citing Plaintiff's Opening Brief, Docket Entry No. 40, p. 17).

⁴¹Id. at 24-25.

language already recites spacing between receivers and/or source points. For example, Claim 1 states, in pertinent part:

(a) deploying receivers in a survey area wherein each receiver is laterally spaced from one another in two horizontal directions wherein the lateral spacing in at least one horizontal direction is **deliberately non-uniform**, wherein the receivers are not aligned in at least one of the two horizontal directions and wherein the spacing between any two seismic receivers in **the deliberately non-uniform direction** varies by a distance of at least five percent between the largest spacing and smallest spacing;⁴²

and Claim 3 states:

[t]he method according to claim 1, wherein at least twenty percent of the deployed receivers are spaced more than ten percent further apart in **the non-uniform spacing direction** than the smallest spacing between receivers in **the non-uniform direction**.⁴³

The contexts in which the related terms are used in Claims 4-10, 12-14, and 16 are comparable to the contexts quoted above from Claims 1 and 3, and make it similarly apparent that the related terms need no construction. Accordingly, the court concludes that the terms related to the term "deliberately non-uniform," i.e., "the deliberately non-uniform direction," "the non-uniform spacing direction," and "the non-uniform direction," need no further construction because their meanings are easily understood and apparent even to lay judges. See Phillips, 415 F.3d at 1314.

⁴² '248 Patent, Exhibit 4 to Plaintiff's Complaint, 10:33-38, Docket Entry No. 1-5, p. 19 (emphasis added).

⁴³ Id. at 10:56-60, Docket Entry No. 1-5, p. 19 (emphasis added).

3. "Wherein the Receivers Are Not Aligned in at Least One of the Two Horizontal Directions"

Disputed Term	Patent	Plaintiff's Construction	Defendants' Construction
"wherein the receivers are not aligned in at least one of the two horizontal directions"	'248 claims 1, 10 and 14	Plain and ordinary meaning.	Wherein the receivers are not aligned in common lines or straight columns in at least one of the two horizontal directions, which is intended for more accurate reconstruction of the seismic data acquired.

Asserting that "[it] is unclear why Defendants seek to construe this phrase containing the term 'two horizontal directions' independently from and differently from, the other 'two horizontal directions' terms," and that this disputed term can be broken down into two separate clauses: "wherein the receivers are not aligned," and "in at least one of the two horizontal directions,"⁴⁴ plaintiffs argue that it needs no construction because the claim language is not disputed and because defendants improperly seek to limit the invention by introducing extraneous words and importing an intended benefit of the invention into the construction of a single term.⁴⁵ Plaintiff argues that defendants seek to add, "which is intended for more accurate reconstruction of the seismic data acquired." However, this additional language is virtually identical to the language Defendants proposed to construe the term "deliberately non-uniform." However, there is no

⁴⁴Plaintiff's Opening Brief, Docket Entry No. 40, p. 18.

⁴⁵Id. at 18-20. See also Plaintiff's Reply, Docket Entry No. 44, p. 14.

overlapping claim language supporting injecting this additional language in a distinct claim term. Other than an attempt to pollute the claims with this phrase at every opportunity, there is no legal basis that supports adding an identical limitation to define other terms using completely different language.⁴⁶

Plaintiff argues that assuming defendants'

proposed constructions were adopted (which they should not be), claim 1 of the '248 [Patent] would have many internal inconsistencies, including different descriptions for two horizontal directions and repeating the intended benefit clause twice for different elements, when importing such benefits is improper. . .⁴⁷

Defendants respond that their proposed construction is supported by the specification and the prosecution history neither of which are addressed in plaintiff's Opening Brief.⁴⁸ Defendants argue that their proposed construction

addresses "wherein the receivers are not aligned" and retains "in at least two horizontal directions" for context since the proposed construction is intended to construe (not replace) the disputed term in the claim. . . The remainder of [defendants'] proposed construction includes words [plaintiff] used to describe the claimed invention and distinguish the prior art.⁴⁹

Defendants explain that

[d]uring prosecution of the '248 Patent, [plaintiff] used the same term "straight columns" and "common lines" to distinguish the prior art. [Plaintiff] argued:

⁴⁶Plaintiff's Opening Brief, Docket Entry No. 40, p. 19.

⁴⁷Id.

⁴⁸Defendants' Response, Docket Entry No. 41, pp. 25-29.

⁴⁹Id. at 25.

It can be seen from geophone arrays in figures 12 and 13 of *Clay* that the geophones are all in common lines or straight columns from the top to bottom of each array. In other words, the geophones are all aligned in a single direction in both these two dimensional arrays. By contrast, the amended claims define that at least the source points or the receivers are not aligned in at least one of the two horizontal directions. . . .

Conoco's April 2, 2015 Response (Ex. J) at pp. 7-8. Conoco relied on the same terms and argument to distinguish the prior art during prosecution of the related foreign counterpart application in Australia. Conoco's Australian Response (Ex. K) at p. 2. [Defendants'] proposed construction therefore, does not improperly import limitations from the specification into the claims but, instead, uses the same words Conoco used (common lines or straight columns) to distinguish the prior art.⁵⁰

Asserting that "[t]he critical objective of the spacing between the receivers is to achieve more accurate reconstruction of the acquired seismic data,"⁵¹ defendants argue that "[w]hether the spacing between the receivers is deliberately non-uniform or not aligned, it is unequivocally 'intended for more accurate reconstruction of the seismic data acquired.'"⁵²

After carefully considering all of the evidence the court concludes that the term "wherein the receivers are not aligned in at least one of the two horizontal directions" is sufficiently

⁵⁰Id. at 26 (citing Conoco's April 2, 2105 Response, pp. 7-8, Exhibit J, Docket Entry No. 41-11, pp. 8-9; and Conoco's Autralian Response, p. 2, Exhibit K, Docket Entry No. 41-12, p. 3).

⁵¹Id. at 27.

⁵²Id. at 28. See also Defendants' Sur-Reply, Docket Entry No. 46, pp. 13-14.

clear to make even resort to a dictionary unnecessary. See Chef America, 358 F.3d at 1373 (as a general rule ordinary English words "whose meaning is clear and unquestionable" need no further construction). Neither party has argued the existence of a customary meaning in the art that differs from or contradicts the plain and ordinary meaning of either the disputed term or the words used in the disputed term. Moreover, for the reasons already stated in § II.A.1, above, the court has already concluded that the term "two horizontal directions" and the related terms "both horizontal directions," "in at least one horizontal direction," and "in at least one direction," need no construction because their plain and ordinary meanings are readily apparent. See Phillips, 415 F.3d at 1314. Nor is the court persuaded that anything in either the specification or the prosecution history clearly support the defendant's contention that the plaintiff intended to use the term "wherein the receivers are not aligned in at least one of the two horizontal directions two horizontal directions" in a manner other than according to its plain and ordinary meaning. Although the parties acknowledge that an intended benefit of the invention is more accurate reconstruction of the seismic data acquired, defendants fail either to cite any authority or to offer any cogent reason why this or any other disputed term that does not appear in all of the claims should be construed to include a statement of the invention's intended benefit.

Defendants also argue that they propose using the same words that plaintiff chose to distinguish the prior art, and that when such words are applied to construe (not replace) the disputed phrase in the claims, plaintiff's intended meaning is clear and easily understood as "wherein the receivers are not aligned in common lines or straight columns in at least one of the two horizontal directions, which is intended for more accurate reconstruction of the seismic data acquired."⁵³ See, Spectrum International, 164 F.3d at 1378 (explicit meanings given to claim terms in order to overcome prior art will limit those terms accordingly). In particular, defendants argue that during prosecution of the '248 patent, plaintiff argued in a April 2, 2015, Response to a Final Office Action Dated January 5, 2015, that rejected Claims 1-2, 4-12, and 14-19 as anticipated by Clarence S. Clay, Jr.:

It can be seen from geophone arrays in figures 12 and 13 of Clay that the geophones are all in common lines or straight columns from the top to bottom of each array. In other words, the geophones are all aligned in a single direction in both of these two dimensional arrays.

By contrast, the amended claims define that at least the source points or the receivers are not aligned in at least one of the two horizontal directions in which the source points or receivers are laterally spaced from each other. Arrangements of receivers and/or source points including this limitation are depicted in figure 5 of the present application (the receivers are not aligned in a direction from the bottom to the top of the page), figure 6 (in which the receivers are not aligned in any

⁵³Defendants' Response, docket Entry No. 41, pp. 28-29.

direction), figure 9 (in which the source points are not aligned in a direction running from the left to the right of the page), figure 10 (in which the source points are not aligned in a direction running from the bottom to the top of the page) and figure 11 (in which neither the source points nor the receivers are aligned in any directions[]).

Clay does not teach such an arrangement, in particular due to the requirement to follow its mathematically precise formula. . .⁵⁴

Defendants argue that these statements were made on January 5, 2015, in response to an office action rejecting many of the plaintiff's claims. But defendants overlook the fact that the response used the proposed language "common lines or straight columns" only when describing figures 12 and 13 in the Clay patent. In other words plaintiff used "common lines or straight columns" in the prosecution history to describe the alignment shown in Clay and did not use that language either to describe its own invention or to modify or limit the word "align." The court therefore concludes that the prosecution history does not support defendants' proposed construction of the disputed term because defendants have shown only that plaintiff used "common lines or straight columns" to describe the type of alignment shown in Clay and have failed to cite any evidence showing that plaintiff used that language to modify or limit the word "align" to mean only "common lines or straight columns." Moreover, the narrow construction that

⁵⁴Response to Final Office Action Dated January 5, 2015, Exhibit J, Docket Entry No. 41-11, pp. 8-9.

defendants propose for this term contradicts the following passage in the specification:

It should be understood that receiver lines and source lines may still be implanted with varying degrees of freedom, but noting that there are no particular requirement that the orientation of the source line and receiver lines be orthogonal for the wavefield reconstruction work. The lines may be oriented with variations in direction, patterns or layout. Some of the more common in the industry are the brick, zig-zag, slash and inline survey designs. Non-uniform line and station spacing for wavefield reconstruction work equally well with each of these survey technique[s].⁵⁵

Defendants thus have not shown that sufficient reasons exist to import their limiting construction of the disputed term "wherein the receivers are not aligned in at least one of the two horizontal directions" into the clear language of the claims.

B. Terms from the '193 Patent

1. "Determining Optimal Sampling Grid During Seismic Data Reconstruction"

Disputed Term	Patent	Plaintiff's Construction	Defendants' Construction
"determining optimal sampling grid during seismic data reconstruction"	'193 claim 1	Preamble is not limiting.	Preamble is limiting.

The term "determining optimal sampling grid during seismic data reconstruction" appears in the preamble of Claim 1 of the '193

⁵⁵ '248 Patent, 10:6-16, Docket Entry No. 1-5, p. 19.

patent. The parties agree that this term needs no construction,⁵⁶ but dispute whether it is limiting. Citing Rowe v. Dror, 112 F.3d 473, 478 (Fed. Cir. 1997), and Catalina Marketing International, Inc. v. Coolsavings.com, Inc., 289 F.3d 801, 808 (Fed. Cir. 2002), plaintiff argues that this term is not limiting because “[i]t is black letter law that preambles are not limiting ‘where a patentee defines a structurally complete invention in the claim body and uses the preamble to only state the purpose or intended use for the invention.’”⁵⁷ Asserting that “the preamble merely provides context for the claim and does not ‘breathe life’ into it,”⁵⁸ plaintiff argues that

Claim 1 includes four complete elements that, on their own and without the preamble, ‘define[] a structurally complete invention.’ Rowe, 112 F.3d at 478. . . . Accordingly, the preamble should not be limiting and Defendants’ position should be rejected.⁵⁹

Asserting that Claim 1 “recites the steps of a method – not structure as argued by [plaintiff],” that “Claim 1 requires constructing an optimization model,” and that “[t]he Parties agreed construction of an optimization model is ‘a model used for optimizing the reconstruction of the seismic data,’”⁶⁰ defendants

⁵⁶Joint Claim Construction Statement, Docket Entry No. 38, p. 3.

⁵⁷Plaintiff’s Opening Brief, Docket Entry No. 40, p. 20.

⁵⁸Id. at 21.

⁵⁹Id.

⁶⁰Defendants’ Response, Docket Entry No. 41, p. 9.

argue that "[t]he preamble [] not only gives meaning to claim 1 but is also used with step (a) to define the subject matter of the claimed invention."⁶¹ Defendants cite Bell Communications Research, Inc. v. Vitalink Communications, Corp., 55 F.3d 615, 620 (Fed. Cir. 1995), and Catalina Marketing, 289 F.3d at 810-11, in support of their argument.

Reasserting that "elements (a)-(d) of claim 1 are a structurally complete invention,"⁶² plaintiff argues that (1) "defendants' conclusory argument that the body of claim 1 is 'ill-defined' lacks any explanation as to *what* the claim is lacking or *how* the preamble would give it essential meaning,"⁶³ (2) the preamble language in dispute "is merely language 'stating a purpose or intended use,'"⁶⁴ and (3) "[t]here is no basis in the preamble, the claim language, the patent specification, or the prosecution history to find that the preamble language is a limitation on the claimed invention."⁶⁵ Asserting that defendants misapply Catalina Marketing and Bell Communications to try and reach a different result, plaintiff argues that

Defendants stretch these cases beyond their limits by suggesting that the agreed construction for the term

⁶¹ Id.

⁶² Plaintiff's Reply, Docket Entry No. 44, p. 16.

⁶³ Id.

⁶⁴ Id.

⁶⁵ Id. 17.

"optimization model" is somehow a concession that the preamble should limit Claim 1. Response, p. 5. However, the agreed construction has a completely different context and includes different words. Defendants' position that the preamble language appears in the body of the claim is undermined by their own statement that, in "other words," the agreed construction effectively means the same thing as the preamble (which it does not). Neither *Bell Communications* nor *Catalina Marketing* support such a logical leap between actual recitation and "other words." Indeed, Defendants cannot now try to import additional claim limitations into the agreed definition of "optimization model."⁶⁶

In pertinent part the patent states:

What is claimed is:

1. A computer-implemented method for determining optimal sampling grid during seismic data reconstruction, the method comprising:
 - a) constructing an optimization model, via a computing processor, given by $\min_{\mu} \|S\mu\|_1$ s.t. $\|R\mu - b\|_2 \leq \sigma$ wherein S is a discrete transform matrix, b is seismic data on an observed grid, μ is seismic data on a reconstruction grid, σ represents noise level in observed data, and matrix R is a sampling operator;
 - b) defining mutual coherence as . . . wherein r is sampling grid, r_1 are Fourier transform coefficients, . . . , and n is number of elements in r,
 - c) deriving a mutual coherence proxy, wherein the mutual coherence proxy is a proxy for mutual coherence when S is over-complete and wherein the mutual coherence proxy is exactly the mutual coherence when S is a Fourier transform; and
 - d) determining a sample grid $r_* = \arg \min_{\mu} \mu(r)$.⁶⁷

⁶⁶Id. at 17.

⁶⁷ '193 Patent, 18: 5-29, Docket Entry No. 1-3, p. 26.

Before Claim 1 describes the actual steps of the method patented by the '193 Patent, it provides an introductory "preamble" stating: "A computer-implemented method for determining optimal sampling grid during seismic data reconstruction, the method comprising: . . ."⁶⁸ Generally, the preamble does not limit the claims. DeGeorge v. Bernier, 768 F.2d 1318, 1322 n. 3 (Fed. Cir. 1985). However, the preamble may be limiting "when the claim drafter chooses to use both the preamble and the body to define the subject matter of the claimed invention." Bell Communications, 55 F.3d at 620. If the preamble is "necessary to give life, meaning and vitality" to the claim it should be construed as limiting. Kropa v. Robie, 187 F.2d 150, 152 (CCPA 1951). Whether statements made in the preamble are limiting is determined "on the facts of each case in view of the claimed invention as a whole." In re Stencel, 828 F.2d 751, 754 (Fed. Cir. 1987). See also Applied Materials, Inc. v. Advanced Semiconductor Materials America, Inc., 98 F.3d 1563, 1572-73 (Fed. Cir. 1996) ("Whether a preamble stating the purpose and context of the invention constitutes a limitation of the claimed process is determined on the facts of each case in light of the overall form of the claim, and the invention as described in the specification and illuminated in the prosecution history.").

⁶⁸Id. at 18: 5-7, Docket Entry No. 1-3, p. 26.

Defendants argue that the term "determining optimal sampling grid during seismic data reconstruction" should be interpreted as a claim limitation. Plaintiff responds that this is simply a term that states the purpose or intended use for the claimed invention. The court is persuaded by the defendants' argument. Although the term "determining optimal sampling grid during seismic data reconstruction" states the purpose or intended use for the claimed invention, the court is not persuaded by plaintiff's argument that the body of the claim defines a complete invention. A preamble to a claim "has the import that the claim as a whole suggests for it." Bell Communications, 55 F.3d at 620. The preamble language at issue is directed to "determining optimal sampling grid during seismic data reconstruction." That aspect of the invention is again stated in the first paragraph of the claim:

- a) constructing an optimization model, via a computing processor, given by [an equation] wherein S is a discrete transform matrix, b is seismic data on an observed grid, μ is seismic data on a reconstruction grid, σ represents noise level in observed data, and matrix R is a sampling operator . . .⁶⁹

"Determining optimal sampling grid during seismic data reconstruction," is thus the essence of this invention; its appearance in the preamble of Claim 1 gives "life and meaning" to the manipulative steps. See Kropa, 187 F.2d at 152 (stating that a preamble is limiting when it is "necessary to give life, meaning

⁶⁹Id. at 18: 8-13, Docket Entry No. 1-3, p. 26.

and vitality to the claims or counts"). Consideration of the preamble gives meaning and purpose to the manipulative steps in this claim. The first step recites "constructing an optimization model, via a computing processor" using a stated equation. In the absence of the preamble's stated objective of "determining optimal sampling grid during seismic data reconstruction," the term "constructing an optimization model, via computing processor" is empty language. What is one optimizing a model to do? Similarly, without the preamble, "determining a sample grid" in the fourth step of the method has no purpose. Constructing an optimization model and determining a sample grid alone are merely academic exercises. The preamble is thus a necessary limitation. See Griffin v. Bertina, 285 F.3d 1029, 1033 (Fed. Cir. 2002) (construing the preamble to be limiting). The court's conclusion that "determining optimal sampling grid during seismic data reconstruction" used in the preamble of Claim 1 is a necessary limitation is additionally supported by the fact that "[t]he Parties agreed construction of an optimization model is 'a model used for optimizing the reconstruction of the seismic data.'"⁷⁰ Accordingly, the court concludes that the term "determining optimal sampling grid during seismic data reconstruction" is limiting.

⁷⁰Defendants' Response, Docket Entry No. 41, p. 9. See also Joint Claim Construction Statement, Docket Entry No. 38, pp. 3-4.

2. "Deriving a Mutual Coherence Proxy, Wherein the Mutual Coherence Proxy is a Proxy for Mutual Coherence When S is Over-Complete and Wherein the Mutual Coherence Proxy is Exactly the Mutual Coherence When S is a Fourier Transform"

Disputed Term	Patent	Plaintiff's Construction	Defendants' Construction
"deriving a mutual coherence proxy, wherein the mutual coherence proxy is a proxy for mutual coherence when S is over-complete and wherein the mutual coherence proxy is exactly the mutual coherence when S is a Fourier transform"	'193 claim 1	Plain and ordinary meaning.	Indefinite.

The term "deriving a mutual coherence proxy, wherein the mutual coherence proxy is a proxy for mutual coherence when S is over-complete and wherein the mutual coherence proxy is exactly the mutual coherence when S is a Fourier transform" is ¶ (c) or step 3 of claim 1 of the '193 patent. Plaintiff argues that this term is readily understood by those of ordinary skill in the art and should be construed consistent with its plain and ordinary meaning.⁷¹ Plaintiff argues that defendants' contention that this term is indefinite is based on the declaration of their expert, Dr. Yilmaz,

⁷¹Plaintiff's Opening Brief, Docket Entry No. 40, pp. 21-22. See also Plaintiff's Reply, Docket Entry No. 44, pp. 18-21 (citing Exhibit F to Plaintiff's Opening Brief, Rebuttal Declaration of Dr. Justin Romberg in Support of ConocoPhillips Company's Claim Construction ("Romberg Rebuttal Declaration"), Docket Entry No. 40-7, pp. 4-5 ¶¶ 76-78).

"who omits any reference to the definition of S being over-complete in his declaration, which is key to understanding the 'mutual coherence proxy.'"⁷²

Asserting that "deriving a M[utual] C[ohere]nce proxy is neither plain nor ordinary,"⁷³ defendants argue that this term is inherently indefinite because it renders claim 1 internally inconsistent and conflicts with the teaching of the specification.⁷⁴ Quoting the specification, defendants argue that "[e]ven if such an obscure phrase had a plain and ordinary meaning, [plaintiff] unequivocally defined the result of EQ [i.e., equation] 37 as 'our mutual coherence proxy.'"⁷⁵ Asserting that "a person of ordinary skill in the art . . . would clearly understand that the M[utual] C[ohere]nce proxy derived in step (c) and the M[utual] C[ohere]nce defined in step (b) would have different meanings because they are different terms,"⁷⁶ defendants argue that "[b]ecause [plaintiff] chose to use the same equation to define the M[utual] C[ohere]nce proxy derived in step (c) and the M[utual] C[ohere]nce in step (b),

⁷²Plaintiff's Opening Brief, Docket Entry No. 40, p. 24.

⁷³Defendants' Response, Docket Entry No. 41, p. 12.

⁷⁴Id. at 10.

⁷⁵Id. at 12 (quoting '193 Patent, 14:63-65, Docket Entry No. 1-3, p. 24).

⁷⁶Id. at 13.

it renders steps (b) and (c) internally inconsistent and therefore, indefinite.⁷⁷ Defendants argue that

[t]he specification further confirms the equations defining the M[utual] C[ohere]nce proxy (EQ 37) and M[utual] C[ohere]nce (EQ 32) must, indeed, be different. Using the same equation to define the M[utual] C[ohere]nce in step (b) and derive the M[utual] C[ohere]nce proxy in step (c) thus, conflicts with the teaching of the specification.⁷⁸

In support of their argument, defendants cite Trustees of Columbia University in the City of New York v. Symantec Corp., 811 F.3d 1359 1366-67 (Fed. Cir. 2016) (holding the claims indefinite because the claims describe the step of extracting machine code instructions from something that does not have machine code instructions); and Competitive Technologies, Inc. v. Fujitsu Ltd., 185 F. App'x 958, 965-66 (Fed. Cir. 2006) (holding the claim internally inconsistent and thus, indefinite because the "address means" limitation of claim 5 requires ISA structures, and the "sustain means" limitation of the same claim excludes ISA structures).

Defendants' arguments address the indefiniteness of the claim in which the disputed term appears, not the indefiniteness of the disputed term, *i.e.*, "deriving a mutual coherence proxy, wherein the mutual coherence proxy is a proxy for mutual coherence when S is over-complete and wherein the mutual coherence proxy is exactly the mutual coherence when S is a Fourier transform." Defendants

⁷⁷Id.

⁷⁸Id. at 14.

recognize that Step (b) defines mutual coherence, which is referred to twice in step (c), and that Step (c) compares mutual coherence defined in step (b) with mutual coherence proxy. Although defendants cite only one equation in the specification as an equation for calculating mutual coherence, i.e., EQ 32, the court reads the specification as identifying at least equations for calculating mutual coherence, i.e., EQs 31-32 and 37,⁷⁹ and as explaining that "Equation 37 can be computed efficiently using the fast Fourier transform, and is our mutual coherence proxy."⁸⁰

An indefinite claim is invalid if its language "read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." Nautilus, Inc. v. Biosig Enterprises, Inc., 134 S. Ct. 2120, 2124 (2014). Although a determination of indefiniteness is intertwined with claim construction, a court must first determine what the terms used in a claim mean before it can determine whether the claim is invalid for indefiniteness. See Harrah's Entertainment v. Station Casinos, Inc., 321 F.Supp.2d 1173, 1176 (D. Nev. 2004), aff'd, 154 F. App'x 928 (Fed. Cir. Nov. 15, 2005).

⁷⁹ 193 Patent, 3:46-57, and 13:59-14:65 (Equations 31-32 and 37), 14: Docket Entry No. 1-3, pp. 19 and 24.

⁸⁰ Id. at 14:63-67, Docket Entry No. 1-3, p. 24.

Generally, "the weight of the jurisprudence disfavors indefiniteness determinations at the Markman stage of patent litigation." CSB-System International Inc. v. SAP America, Inc., 2011 WL 3240838 at *20 & n.16 (E.D. Pa. July 28, 2011).

Several principles mitigate against ruling on indefiniteness at the Markman stage: first, the high burden of proof on the party challenging a patent claim for indefiniteness; second, the fact that a claim is not indefinite merely because the parties dispute its meaning; and, finally, the dispositive effect of a ruling on indefiniteness, which invalidates the claim entirely.

Gilead Sciences, Inc. v. Mylan, Inc., Civil Action No. 1:14CV99, 2015 WL 1534067, *2 (N.D.W.Va. April 6, 2015). Although a court may find a term invalid for indefiniteness after construing the term, what a term means to a person of ordinary skill in the art is a separate question from whether it is sufficiently definite to put others in the field on notice regarding the bounds of the claims.

Id. For these reasons, courts have elected to wait to address indefiniteness at the summary judgment stage. Id. (denying the defendant's indefiniteness argument without prejudice, subject to renewal during summary judgment). See also Mannatech, Inc. v. TechMedia Health, Inc., Civil Action No. 3:06-CV-00813-P, 2009 WL 3614359 at *15 (N.D. Tex. Oct. 29, 2009) (consideration of the indefiniteness issue was not appropriate at the claim construction phase). But see Interval Licensing LLC v. AOL, Inc., 766 F.3d 1364, 1377-78 (Fed. Cir. 2014) (upholding judgment of invalidity due to indefiniteness made during claim construction).

The court recognizes that it is well within its power to consider indefiniteness as part of the claim construction process, if it make sense to do so. In the present case, however, it does not make sense to consider indefiniteness during claim construction. Whether ¶ (c) of Claim 1 of the '193 Patent is indefinite because it is mathematically impossible for the mutual coherence proxy derived in step (c) pursuant to the disputed term, i.e., "deriving a mutual coherence proxy, wherein the mutual coherence proxy is a proxy for mutual coherence when S is over-complete and wherein the mutual coherence proxy is exactly the mutual coherence when S is a Fourier transform," to meet the condition stated in step (b) when S is over-complete, is a matter more appropriately addressed on summary judgment. See Gilead Sciences, 2015 WL 1534067 at *2 (determining that consideration of the indefiniteness issue was not appropriate at the claim construction phase); Mannatech, 2009 WL 3614359 at *15 (same).

3. "Stochastic Global Optimization Method"

Disputed Term	Patent	Plaintiff's Construction	Defendants' Construction
"stochastic global optimization method"	'193 claim 4	Plain and ordinary meaning.	Indefinite.

The term "stochastic global optimization method" appears in the claim 4 of the '193 patent which states: "4. The method of claim 1, wherein the sample grid is determined via stochastic

global optimization method.”⁸¹ Plaintiff argues that the disputed term “stochastic global optimization method” is readily understood by those of ordinary skill in the art and should be construed consistent with its plain and ordinary meaning.⁸² Citing Dow Chemical Co. v. Nova Chemicals Corp. (Canada), 803 F.3d 620, 630 (Fed. Cir. 2015), cert. denied, 136 S. Ct. 2452 (2016), and Teva Pharmaceuticals USA, Inc. v. Sandoz, Inc., 789 F.3d 1335 (Fed. Cir. 2015), defendants argue that this term is indefinite because “the ‘193 Patent fails to disclose any known “stochastic global optimization method” in the specification and neither the ‘193 Patent nor its prosecution history offer any guidance as to which stochastic global optimization method should be used among the many different available prior art methods.”⁸³ Plaintiff replies that claim 4 is not indefinite because defendants’ expert concedes that there are multiple methods that fall within the scope of the term “stochastic global optimization method,”⁸⁴ and because the ‘193 Specification discloses two types of stochastic global optimization

⁸¹Id. at 18:34-35, Docket Entry No. 1-3, p. 26.

⁸²Plaintiff’s Opening Brief, Docket Entry No. 40, p. 25.

⁸³Defendants’ Response, Docket Entry No. 41, p. 16.

⁸⁴Plaintiff’s Sure-Reply, Docket Entry N. 44, p. 22 (citing Rebuttal Declaration of Ozgur Yilmaz, Exhibit H to Plaintiff’s Opening Brief, Docket Entry No. 40-9, pp. 8-9 ¶ 17).

methods, i.e., the Monte Carlo simulations described at 16:12-20, and a randomized greedy algorithm.⁸⁵

Although defendants' arguments address the indefiniteness of the claim in which the disputed term appears, not the indefiniteness of the disputed term, i.e., "stochastic global optimization method," the dispute over this term is analogous to the dispute over the term "molecular weight" that the Federal Circuit addressed in Teva, 789 F.3d at 1338. The dispute in Teva involved three relevant measures for molecular weight – peak average molecular weight ("M_p"), number average molecular weight ("M_n"), and weight average molecular weight ("M_w") – where each measure was calculated in a different manner and each typically had a different value. Id. Observing that neither the claims nor the specification contained an explicit definition of molecular weight, id., and that the prosecution history contained inconsistent statements, id. at 1342-1344, the court held that the claims were indefinite. Id. at 1344-45. This was so even though the patentee's expert testified that someone skilled in the art could determine which method was the most appropriate. Id. at 1338, 1341. For essentially the same reasons, i.e., because neither the claims nor the specification contain an explicit definition of "stochastic global optimization method," the court concludes that the term is indefinite.

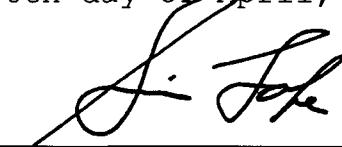
⁸⁵Id. at 22-24.

III. Order

For the reasons stated above, the court adopts the following constructions for the disputed terms of '248 Patent:

Patent	Disputed Term	Construction
'248	"two horizontal directions"	Plain and ordinary meaning.
	"both horizontal directions"	Plain and ordinary meaning.
	"in at least one horizontal direction"	Plain and ordinary meaning.
	"in at least one direction"	Plain and ordinary meaning.
	"deliberately non-uniform"	Plain and ordinary meaning.
	"the deliberately non-uniform direction"	Plain and ordinary meaning.
	"the non-uniform spacing direction"	Plain and ordinary meaning.
	"the non-uniform direction"	Plain and ordinary meaning.
	"wherein the receivers are not aligned in at least one of the two horizontal directions"	Plain and ordinary meaning.
'193	"determining optimal sampling grid during seismic data reconstruction"	Preamble is limiting.
	"deriving a mutual coherence proxy, wherein the mutual coherence proxy is a proxy for mutual coherence when S is over-complete and wherein the mutual coherence proxy is exactly the mutual coherence when S is a Fourier transform"	Because the parties' arguments address the indefiniteness of the claim in which the disputed term appears, not the indefiniteness of the term, this issue is better left to a later stage of this action.
	"stochastic global optimization method"	Indefinite.

SIGNED at Houston, Texas, on this 26th day of April, 2019.



SIM LAKE
UNITED STATES DISTRICT JUDGE